D22 Software Engineering
1999 Exam
2.5 Hours

Lecturer: Dr. Graham Roberts, Dept. of Computer Science

Answer THREE Questions

1. The following 11 terms are commonly used in a software engineering context. Give a short explanation for each of them: idiom, scenario, instance, data dictionary, substitutability, association, component, dynamic binding, problem domain, validation, prototyping.

   [3 marks each]

   [Total 33 marks]

2. a) Engineering activities typically have a ‘process’ or method — a procedure or set of procedures that can be followed to achieve a particular result. What are the arguments for and against having a ‘process’?

   [10 marks]

   b) What defines an engineering discipline? Is the label ‘software engineering’ justified when describing software development?

   [10 marks]

   c) Object-oriented development methods are rapidly replacing older structured development methods. Has structured development failed and why should object-oriented development prove to be any better?

   [13 marks]

   [Total 33 marks]

3. a) Explain what is meant by ‘modelling a system’.

   [8 marks]

   b) What models can be constructed using UML?

   [10 marks]

   c) Assume you are the leader of a team of 6 developers working on the development of a large software system. Put forward a plan for organising the team so as to produce an accurate set of models for the system. How do you ensure that quality and consistency are maintained?

   Is your plan still valid if the team size increases to 25 people?

   [15 marks]

   [Total 33 marks]

4. Consider the following short specification for a proposed software system:

   "A small publishing company requires a software system to manage customer subscriptions to the journals that it publishes. A journal is published a fixed number of times a year and subscriptions may be taken out for 1, 2 or 3 years, payment in advance. Journals are delivered by post. The software system must keep track of all subscriptions for each journal along with payment details.

   Once a month the system will be used to check the status of all subscriptions and generate renewal notices for those that will expire after the next journal has been sent. Subscriptions that have not been renewed will be expired.

   When a new edition of a journal is published, the system must generate address labels for all current subscribers."

   a) Identify a set of classes that could be used to represent the system and construct an UML class diagram.

   [18 marks]

   b) Draw an UML collaboration diagram to show how an address label might be generated.

   [10 marks]

   c) Is object-oriented development the best way to proceed with the design and implementation of this system? Justify your answer.

   [5 marks]

   [Total 33 marks]

5. a) What is a design pattern? Describe an example pattern to illustrate your answer.

   [8 marks]

   b) What is software architecture? What role does architecture play in software development?

   [10 marks]

   c) Outline the relationships between design patterns, architecture and the idea of layers of change. How do these relationships help to design a system?

   [15 marks]

   [Total 33 marks]

END OF PAPER